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Responsiveness of Smart Card in Restaurants: Factor analysis approach

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Abstract

The range of payment products and services in the market are expanding in response to advances and support of creative technologies. In this respect, this study extends the Technology Acceptance Model (TAM) to examine customer responsiveness towards the actual usage of Malaysia's "Touch 'n Go" smart card amongst restaurant customers. Factor analysis using Principal Axis Factoring (PAF) extraction method and oblique rotation conducted to confirm the factor structure and unidimensionality of the constructs. The reliability analysis and constructs correlation performed to provide evidence in constructing the validity. Results revealed that two factors extracted from the three core determinants of customer responsiveness. Dimensions such as Awareness, Brand Image, Attitude and Post Purchase Behavior of the smart card remain as there are some items removed due to insignificant factor loadings. Replication of this factor analysis through further research is significant to customize the research framework.

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Keywords: Responsiveness; smart card; restaurants; technology acceptance model

1. Introduction

With the general thrust of developments and in line with the technological advancement and the demands of the economy as a whole, the payment systems of all developed countries have gone through incredible revolutions over the years (Elliot and Avison, 2005). Penetrate into payment systems has

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expanded, offering greater competence and expediency to consumers and businesses. The volumes and estimate of U.S. consumers' that use cash in payment transactions continually declining from year to year (Aite Group, 2011). It predicted four to seventeen percents of consumers using cash slightly drop more than USD 1 trillion per year between the year 2010 to 2015. Similar to the country known as "Land of the Rising Sun", the electronic payment market in Japan has grown rapidly from $6 billion to $22 trillion between year 2007 to 2012 (Nomura Research Institute, 2008). In short, with the development of technology and the wide adoption of electronic based solutions, the transportation methods for payments shifted to a completely new level of competency and this has become a phenomenon.

Malaysia makes no exception in embarking on the electronic payments and this has become a part of the national agenda to increase the efficiency of the nation's payment systems which would ultimately improve the competitiveness of the economy. The Bank Negara Malaysia Governor, Tan Sri Dr Zeti Akhtar Aziz targets to rise the number of e-payment transactions per capita from 44 transactions in 2010 to 200 transactions by the end of 2020, which is comparable to the e-payment transactions per capita in the developed countries (Bank Negara, 2011).

Despite the tremendous amount of financial resources spent, government, bank institutions and non commercial banks offered the e-payment services, the success rate of it has not commemorated with restaurant operators and the customer's awareness and actual usage. In fact, e-payment technologies such as smart card in particular, its level of acceptance have not been at its peak (Bank Negara, 2011). Currently, there has been no strong evidence indicating the impact of smart cards on the operation of monetary policy. There is the relatively small size and slow progress of smart card transactions compared with the currency supply. In other word, as if no indication that smart card would replace the physical cash. The situation involved in some large, medium and even worst in the small business operations particularly in the department stores, drug stores, grocery stores, gaming including the restaurants. To restaurant customers, e-payment technology offers convenience, ease of use, and fast service (Kincaid & Baloglu, 2005; Mozeik et al., 2009) and increased control over their dining experiences (Kimes, 2008). However, to date, there are only few academic investigations on the adoption of smart cards, specifically in restaurants.

It may be said that the future of smart card seems to be very bright, even more so in the case of Malaysia which is slightly lagging behind and has not yet reached saturation point, which is slowly being approached. Nevertheless, the smart card's future can only remain bright if there is sufficient consumer awareness and restaurant operator's brand image in the underlying payment systems. Therefore, the Government, service providers and restaurant operators need to work together on an international platform to ensure specific standards are set, to truly level the smart cards playing field.

This study is pursuing an interesting and daring task by empirically examine customer responsiveness towards the actual usage of Malaysia's "Touch 'n Go" smart card amongst restaurant customers via the Technology Acceptance Model as the research framework. Academically and practically, it contributes to the overall effort aimed at finding the most appropriate base for explaining the responsiveness of payment technologies in the restaurant industry.

2. Literature review

2.1. Technology acceptance model

Adoption of novel technologies has been examined through the prism of numerous theoretical models, of which the widely supported technology acceptance model (TAM; Davis, 1989) stands out as the most appropriate (Huh, Kim, & Law, 2009; C. H. Lin, Shih, & Sher, 2007). Using the TAM as a theoretical foundation, this study's primary purpose is to examine the factors that impact the customers' actual usage

of smart card in restaurants. In general, the examination of technology adoption dynamics has been found to be more challenging in customer settings where customers have multiple options for system use and the nature of adoption is truly voluntary, than in work-related settings, where technology adoption may be influenced by management's intervention or organizational objectives (C. H. Lin et al., 2007). As the original TAM was designed to predict technology adoption in work-related settings (Davis, 1989), the model were revised and extended in this study to capture the context of customer responsiveness of smart card in restaurants.

2.2. Perceived trust

Trust is the customer confidence that their money and personal information will not use against their personal interest. Even if we use an imperfect system, consumers want to believe that vendors, banks and credit card companies will not misuse their personal information (Abrazhevich, 2004). The other aspect is that customers should trust the payment system adopted by the other user. The existing literature points out that high level of user confidence and trust in EPS is a contributing factor for the successful adoption of e-payment systems (Kurnia and Benjamin, 2007). In analyzing the success of the Octopus system it was found that trust in the system was the contributing factor for its wide usage. This finding was backed by the survey conducted by Abrazhevich (2004), who found that customers will not use systems which they perceive to be less trustworthy. Similarly, another study proved that if trustworthiness is there, adoption of EPS is credible (Kniberg, 2002). The higher the levels of consumer trust, the higher the degree of purchase intentions of consumers, and the easier it is to retain consumers.

2.3. Perceived usefulness

Users' intention to use an information technology is predicated, to a large degree, on their perceived usefulness of the system (Davis et al., 1989). There is also a certain amount of empirical evidence in the mobile technology literature regarding users' intention to use mobile technology (Au & Kauffman, 2008; Mallat, 2007). Users will use m-payment systems when they find the system to be useful for their transaction needs or financial issues. Mozeik et al. (2009) found and concluded that the adoption of e-services in restaurants namely the conventional computing devices (i.e., desktop and laptop computers) was driven by perceived usefulness.

2.4. Perceived ease of use

Cooper (1997) identifies "ease of use" as one of the three important characteristics from the customer's perspective for adoption of innovative service. The adoption of e-services in restaurants such as mobile computing devices (i.e., BlackBerry Smartphones, Palm Pilots) was driven by perceived ease of use confirmed by Mozeik et al. (2009).

2.5. Brand image

Brand image is important because it contributes to the consumer's deciding whether or not the brand is the one for him/her and it influences consumers' subsequent buying behavior (Johnson and Puto, 1987). A well-communicated brand image should help to establish a brand's position, insulate the brand from the competition, enhance the brand's market performance (Keller, 1993; Feldwick, 1996; Park and Srinivasan, 1994).

2.6. Awareness

Adoption can be defined as the acceptance and continued use of a product, service or an idea. Consumers go through "a series of process in knowledge, conviction, decision and confirmation" before they are ready to adopt a new product or service and once the adoption or rejection of an innovation begins, the consumer becomes aware of the innovation (Rogers and Shoemaker, 1971). Howard and Moore (1982) emphasized that adoption "consumers must become aware of the new brand." Lack of awareness is the most important factor that negatively affect Internet banking adoption (Sathye, 1999). In this study context, it can be argued that if the average Malaysian customers not adopting smart card services due to their unawareness of the availability of such a service and or benefits it offers.

3. Methodology

In the initial stage of the study, preliminary interview session conducted in order to gain the restaurant operators view and interpretation of the research issues particularly in identifying the actual usage of Touch 'n Go smart card in the participated restaurants. Based on the response received, restaurant operators stated that the level of acceptance has not been at its peak. In this regard, the aim of this study is to examine customer responsiveness towards the actual usage of Malaysia's "Touch 'n Go" smart card amongst restaurant customers. Using purposive sampling, a self-reported questionnaires to describe the characteristics of the variables of interest were distributed to the respondents. The total number of 100 questionnaires was given to the restaurant customers of the Touch 'n Go stipulated restaurants in the Klang Valley, Malaysia namely Baskin Robins, Burger King, Dunkin Donuts, Starbucks and The Chicken Rice Shop. A letter seeking permission to conduct the study at the designated restaurants was sent to the manager a week before the questionnaires were distributed. Customers were asked to rate their valuable opinions and feedbacks on their response to Touch 'n Go smart card and how it influenced their actual usage. A 100 % response rate of the pilot was obtained for analysis.

4. Data analysis

The data analyzed using IBM SPSS Statistics version 21 for Windows. The descriptive statistics performed for background information of the customers. Factor structure for independent, moderating, mediating and dependent variables constructed separately using exploratory factor analysis based on Principal Axis Factoring (PAF) extraction method with oblique rotation (i.e. Direct Oblimin). Loadings < .55 suppressed since the sample size consist of 100 customers (Hair et. al, 2010). The main purpose of this procedure was to group the acceptable subscales into meaningful distinct factor. Internal consistency reliabilities for each dimension examined using Cronbach's alpha.

5. Results and discussion

5.1. Customer's background information

The respondents were customers from five participating restaurants namely Baskin Robins, Burger King, Dunkin Donuts, Starbucks, and The Chicken Rice Shop which consisted of 49 males (49.0%) and 51 females (51.0%). The majority of the customers (85.0%) were Malays and about half of them (52.0%) aged between 19 to 30 years of age. Most of the customers aware in terms of "Touch 'n Go" usage only in three outlets such as Highway Toll (88.0%), Parking (65.0%) and Public Transport (49.0%). They were

only 22% of the customers had used "Touch 'n Go" card at Starbucks while for other restaurants, the usage were very minimum which was less than 10%.

Table 1. Customer's background information

Background Information	*n*	%
Gender		
Male	49	49.0
Female	51	51.0
Age group		
19 – 30	52	52.0
31 – 40	31	31.0
41 – 50	11	11.0
50 and above	6	6.0
Race		
Malay	85	85.0
Chinese	9	9.0
Indian	4	4.0
Others	2	2.0
*Aware of the Touch 'n Go usage in these outlets		
Highway Toll	88	88.0
Theme Park	2	2.0
Movie	16	16.0
Medical and Healthcare	1	1.0
Public Transport	49	49.0
Parking	65	65.0
Restaurant	26	26.0
Retail	9	9.0
*Have experience using Touch 'n Go card at the following restaurants		
Baskin Robins	6	6.0
Burger King	5	5.0
A & W	2	2.0
Dunkin Donuts	1	1.0
Pancake House	1	1.0
Starbucks	22	22.0
Station 1	2	2.0
The Chicken Rice Shop	6	6.0

*Note: This is multiple response questions. The percentage is based on the number of customers

5.2. Factor analyses for independent, moderating, mediating and dependent variables

The Kaiser-Meyer-Olkin (KMO) index of sampling adequacy for all factor analyses were explored to ensure the sufficiency of covariance in the scale items to warrant factor analysis. The Bartlett's test of sphericity was applied to each analysis to guarantee that the correlation matrix was not an identity matrix. KMO indices for all analyses were > .80, while almost all KMO values of individual items were > .52, which is above the acceptable limit of .50 (Field, 2009), except for one item independent variable. This item was then removed from the analysis. Bartlett's test of sphericity for all analyses were sufficiently large with $p < .001$, indicating that the correlation matrices were not identity matrices.

A number of factors for each variable were accessed through parallel analysis where the eigenvalues from factor analysis were compared with the eigenvalues from Monte Carlo simulation. The number of factors were retained if the eigenvalues from factor analysis exceeded the simulated eigenvalues (Watkins, 2006). Results from parallel analysis in Table 2 indicate that three factors (Perceived Usefulness, Perceived Ease of Use and Perceived Trust) under customer responsiveness (independent

variable) should be collapsed into two factors while for other variables (dependent, moderating and mediating), the structure maintain as they were.

Based on results from parallel analysis, factor analyses were then rerun using the constrained factors with oblique rotation. The results are presented in Table 3.

Table 2. Result from parallel analysis

Variable	Component Number	Actual eigenvalue from factor analysis	Criterion value from parallel analysis	Decision
Independent	1	7.751	1.826	***Accept***
	2	1.890	1.649	***Accept***
	3	1.201	1.509	Reject
	4	1.139	1.403	Reject
	5	.835	1.308	Reject
Dependent	1	3.161	1.283	***Accept***
	2	.958	1.116	Reject
Moderating	1	6.483	1.805	***Accept***
	2	2.759	1.613	***Accept***
	3	1.473	1.492	Reject
	4	.969	1.376	Reject
Mediating	1	5.973	1.562	***Accept***
	2	1.176	1.394	Reject
	3	.732	1.271	Reject

After rotation, customer responsiveness (independent variable) which had been constrained to a 2-factor solution, explained 47.8% of the variance with 13 out of 18 items exceeds the minimum cutoff load off .55 required for a sample of 100 hence, statistical significance. The two factor structure under customer responsiveness are named *Perceived Trust* and *Perceived Usefulness*. Factor loadings loaded in the second factor seems to contrast the first factor with correlation between factors was, $r = -.423$.

On the other hand, different scenario happened to a moderating variable where the structure remains as two factors with 15 out of 17 items loaded to their original factors (i.e., brand image and awareness). The other two items were dropped from the analysis due to insignificant factor loadings. These two factors explained 48.5% of the variance with correlation between factors was, $r = .262$.

One-factor structure solution were seen in both dependent and mediating variables. The dependent variable, or known as post purchase behavior explained 57.4% of the variance with two items were removed from having low individual KMO and insignificant factor loading. Attitude towards using E-payments (mediating variable) managed to maintain all its 11 items with factor loadings > .55. The variance explained by the factor was 50.0%.

There was substantial variation in the Cronbach's alpha values of all variables, ranging from .781 to .915. Given that alpha values greater than .70 are generally considered to indicate a reliable set of items, *Perceived Trust* and *Perceived Usefulness* were very reliable (.883 and .844 respectively). Brand image for moderating variable had excellent reliability (.906), while for awareness, the reliability was reasonable (.781). Both reliabilities for post purchase behavior and attitude were excellent at .902 and .915 respectively.

Table 3. Factor analyses for independent, dependent, moderating and mediating variables

Variable	Factors and Items Included	Original Factor	Factor Loading
Customer's Responsiveness *(Independent)* Correlation between factors, r = -.423	*Perceived Trust*		
	This card would instill the confidence in me when purchasing food	Perceived Trust	.730
	This card would make me feel great to have one and able to enjoy its benefits	Perceived Trust	.675
	This card would mean that I do not have to worry about taking too much cash with me	Perceived Ease of Use	.674
	This card would be trustworthy in purchasing food	Perceived Trust	.641
	This card would be easy for me to become skillful in purchasing food	Perceived Ease of Use	.635
		Perceived Ease of Use	.602
	This card would make purchasing food easier for me	Perceived Trust	.578
	This card would convince me the reliability in purchasing food	Perceived Trust	.551
	This card would convince me the technology used in purchasing food		
	Cronbach's alpha = .883, % variance explained = 40.4, Eigenvalue = 7.27		
	Perceived Usefulness		
	This card would make it easier for me to conduct cashless transactions	Perceived Usefulness	-.715
		Perceived Usefulness	-.714
	This card would enhance my effectiveness in purchasing food	Perceived Usefulness	-.704
	This card would enable me to purchase more food quickly	Perceived Usefulness	-.650
	This card would avoid the queue for payment at the counter	Perceived Ease of Use	-.615
	This card would be an alternate method of purchasing food		
	Cronbach's alpha = .844, % variance explained = 7.45, Eigenvalue = 1.34		
Post Purchase Behavior *(Dependent)*	*Post Purchase Behavior (PPB)*		
	I will keep continue using this card in purchasing food	PPB	.946
	I will use this card whenever available in purchasing food	PPB	.878
	I am planning to use this card in purchasing food	PPB	.781
	I would recommend the use of this card in purchasing food	PPB	.740
	Cronbach's alpha = .902, % variance explained = 57.4, Eigenvalue = 2.87		
Brand Image and Awareness *(Moderating)* Correlation between factors, r = .262	*Brand Image*		
	This card would be a prestige symbol in purchasing food	Brand Image	.815
	This card would be a brand that is keeping with my lifestyle	Brand Image	.813
	This card would be a reputed brand in purchasing food	Brand Image	.786
	This card would be a leading brand in purchasing food	Brand Image	.764
	This card would be a brand I particularly like and find attractive in purchasing food	Brand Image	.743
	This card would be a good reputation in purchasing food	Brand Image	.739
	This card would possess a positive symbolic meaning in purchasing food	Brand Image	.697
	This card would make me feel cool and fashionable	Brand Image	.591
	This card would relate to the pleasant experience in purchasing food	Brand Image	.558
	This card would make me feel important and wealthy	Brand Image	.557
	Cronbach's alpha = .906, % variance explained = 35.4 , Eigenvalue = 6.01		
	Awareness		
	There are restaurants using this card as their means of payment by the customers	Awareness	.737
	This card offers features and benefits in purchasing food	Awareness	.675
	This card can be used in restaurants to purchase food	Awareness	.651

	Payments can be made in purchasing food using this card	Awareness	.583
	This card can conduct various applications	Awareness	.575
	Cronbach's alpha = .781, % variance explained = 13.1, Eigenvalue = 2.22		
Attitude	*Attitude*		
(Mediating)	Using this card in purchasing food would be beneficial for me	Attitude	.815
	Using this card in purchasing food would be convenient for me	Attitude	.797
	Using this card in purchasing food would be a good idea for me	Attitude	.771
	I am willing to use this card in purchasing food	Attitude	.756
	I will probably use this card in purchasing food in the future	Attitude	.746
	I will use this card on a regular basis in purchasing food	Attitude	.738
	I like the idea of using this card in purchasing food	Attitude	.656
	I will share my good experience about using this card in purchasing	Attitude	.642
	food	Attitude	.641
	I intend to use this card in purchasing food	Attitude	.583
	I will continue using this card in purchasing food	Attitude	.581
	I will recommend to my friends to get this card in purchasing food		
	Cronbach's alpha = .915, % variance explained = 50.0, Eigenvalue = 5.50		

Note: 1) *Independent variable:* Five items were removed due to factor loading < .55
2) *Dependent variable:* Two items were removed from having KMO < .50 and factor loading < .55
3) *Moderating variable:* Two items were removed due to factor loading < .55

6. Conclusion and recommendations

This study makes significant contributions to knowledge in relation to customer responsiveness of factors affecting smart card usage. Furthermore, it also provides an insight into the customers' needs and wants which may be essential for restaurant operators in order to provide better services to customers. This evidence is in line with Mozeik et al. (2009) confirmed that the adoption of e-services in restaurants namely the conventional computing devices (i.e., desktop and laptop computers) and mobile computing devices (i.e., BlackBerry Smartphones, Palm Pilots) were driven by perceived usefulness and perceived ease of use. In the light of these findings, several recommendations will be made which may be useful for restaurant operators and other related authorities. Restaurants should make their customer more aware of their new products or services, in this, Touch 'n Go smart card, to encourage a higher response rate. They can do so by having education and publicity through mass media will prove to be effective. The most promising one is that Government authorities like Bank Negara Malaysia (BNM) can also play their role by issuing statements which reassure customer that the government recognizes Touch 'n Go smart card as a trusted brand. By doing so, the strategy makers will make sure that the smart card services are provided and accessible to all segments of society alike. In order to receive greater response towards smart card, it is recommended that the stipulated restaurants and Touch 'n Go Sdn. Bhd. target their promotional activities towards those in the younger business personnel who are computer literate, well educated and are quite well to do as they seem to be the most likely users of Touch 'n Go smart card as indicated in this study. Despite the remarkable of academic and practical contributions, nevertheless it is important to note that this study is also subjected to a few limitations. Firstly, due to time constraints, the respondents is drawn from the metropolitan setting. To be more representative, further research should consider to cover respondents from rural, sub-urban and urban areas. Secondly, based on one city in Klang Valley, which has adopted the Touch 'n Go smart card under their local e-payment services, it could be noted that the results in this study may not be applicable to other cities or even other countries that have similar economical, social and cultural situations. Therefore, any generalizations of the results should take into account the scope of this study. Hence, it is no exaggeration to say that smart card is becoming a necessity and one of the most important elements in this modern technology for customers and businesses in combating with the economic and financial needs of the country. Smart cards may also represent a viable solution to the restaurant industry's technology needs and having a payment system could facilitate the

efficient movement of funds and financial development and the growth of the country's economy. Replication of this factor analysis through further research is significant to customize the research framework.

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